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RESEARCH ARTICLE

The relative impact of school-wide positive behavior support on teachers' perceptions of student behavior across schools, teachers, and students

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Abstract

School-wide positive behavior support (SWPBS) is a systemic approach for implementing a proactive schoolwide discipline and for improving students' academic and behavioral outcomes by targeting the school's organizational and social culture. With a multilevel approach, the present study evaluates the relative effectiveness of SWPBS on teachers' perceptions of the student behavior ($N = 3,295$) across schools, teachers, and children using a multilevel approach. We assessed teacher perception of student problem behavior five times during a 3-year implementation of SWPBS in 23 Dutch schools. Multilevel analyses not only revealed a small increase in perceived prosocial behavior and a small decrease in problems with peers, but also different effects across children, teachers, and schools. Effects were stronger for girls and for students with higher severity of perceived problems at baseline. At teachers' level, higher mean baseline severity of perceived problems was associated with the reduced impact of SWPBS on perceived emotional problems and problems with peers. At the school level, effects were stronger for regular schools as compared with special needs schools.

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KEYWORDS

school-wide positive behavior support (SWPBS), problems, schools, teachers

1 | INTRODUCTION

School-Wide Positive Behavior Support (SWPBS) was developed during the 1970s and 1980s as a proactive approach for improving the academic and behavioral outcomes for students by targeting the school's organizational and social culture. Essential elements of SWPBS include: (a) Establishing clear expectations for all students in the school; (b) teaching these expectations to all students; (c) providing students with the opportunity to practice these expectations; (d) positively reinforcing desired behavior; (e) establishing clear consequences for problem behavior; (f) extending school-wide expectations to all classrooms; and (g) collecting and using data for ongoing decision making (Horner, Sugai, & Anderson, 2010). SWPBS combines evidence-based methods (Sugai et al., 2000) with a comprehensive preventative approach (Walker et al., 1996) and has a strong focus on instructing and practicing positive behavior (Horner, Sugai, Smolkowski, Eber, Nakasato, Todd, 2009). SWPBS is based on a three-tiered prevention logic. Tier 1 interventions support all students, tier 2 interventions support targeted groups of students who are at risk, and tier 3 interventions support interventions with severe problem behavior (Sugai & Horner, 2002).

Several studies have shown that SWPBS implementation can reduce student suspensions and office discipline referrals (Bradshaw, Mitchell, & Leaf, 2010; Bradshaw, Reinke, Brown, Bevans, & Leaf, 2008), reduce student problem behavior (Lassen, Steele, & Sailor, 2006), promote efficient learning behavior (Horner, Sugai, Todd, & Lewis-Palmer, 2005), and improve study results (Horner et al., 2009). In addition, it enhances teacher self-efficacy (Kelm & McIntosh, 2012) and contributes to increased student involvement (Sørli & Ogden, 2015). As such, SWPBS is considered an evidence-based intervention to improve the learning behavior of children (Horner, Sugai, & Anderson, 2010). Still, there is little knowledge of how SWPBS might influence teachers' perception of their students' behavior. Sugai and Horner (2009) reported that the overall perception of teachers becomes more positive, but we are not aware of any empirical research demonstrating this effect. This is unfortunate, as teacher perception is one of the factors influencing the extent to which certain student behavior is a problem in the classroom (Alter, Walker, & Landers, 2013).

Also, an unfavorable perception of student behavior may lead to increased stress levels in the teacher (Bushaw & Gallup, 2008) and to additional unfortunate interactions between student and teacher (Murray & Zvoch, 2011; Whittaker & Harden, 2011). The present research evaluates whether the tier 1 SWPBS intervention, focusing on all children in the school, alters teacher perception of pupil behavior. In addition, because impact may vary in different settings, the relative effectiveness across school types, teachers, and children is studied.

2 | METHODS

2.1 | Design

Schools in Drenthe (a province in the north of The Netherlands with 325 primary schools) were approached by letter to implement SWPBS for a pilot study. This study design involved a longitudinal survey of all teachers in 23 elementary schools that agreed to participate and started SWPBS implementation. These 23 schools included three special needs elementary schools for children who cannot attend mainstream public schools due to their learning skills or behavior.

The moment a school communicated the intention to implement SWPBS, a baseline measurement was performed in all classes at the school ($T = 0$). All teachers filled out a strength and difficulties questionnaire (SDQ-L) for each child in the classroom. Teachers were sent an email containing login information linking directly to their

own class and children. School management gave teachers with time to fill in the questionnaires. Teachers were not trained on how to complete the measures, but the researchers checked if they had filled in questionnaires for all their children. Teachers who had questions about the research or the questionnaires could contact the researchers by mail or phone. There were no "missing data."

The implementation period of the SWPBS program was 3 school years. During these years, four (digital) follow-up measurements were performed. The first baseline measurements on the first school took place in May 2009. The final measurements on the last participating schools were done after the implementation period of 3 years in November 2013. An implementation team was installed to implement SWPBS, the team consisted of the principal, the internal counselor (responsible for children with special needs), and several teachers. A trained SWPBS coach was added to the team as well. The SWPBS coach monitored the implementation 10 times a year for the duration of 3 years. The SWPBS coach was supervised by an American-trained SWPBS supervisor. Schools would fill in self-evaluations about the degree of implementation every 2 months. When baseline measurements were completed, all school teachers and staff received 2 full days of training by an SWPBS certified trainer. Teachers and staff would also receive two full days of training in the second and in the third year, based on the course book "Best behavior: building positive behavior support in schools" (Sprague & Golly, 2004). For all the schools the trainers verified whether the coaching sessions and the training had taken place. After completion of the third year, the degree of implementation of the program in schools was evaluated by the researchers. However, no data were collected for this evaluation.

2.2 | Measurement tools and variables

Teacher perception of student behavior was assessed with the teacher version of the SDQ-L. The SDQ was developed on the basis of common child behaviors described in the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association,). The SDQ has shown relatively high reliability (Goodman, Lamping, & Ploubidis, 2010). Goedhart, Treffers, and Widenfelt (2003) judged the internal consistency of the questionnaire as "good." In a Dutch context (Diepenmaat, Van Eijdsen, Janssens, Loomans & Stone 2014), both the internal and external validity of the SDQ-L turned out to be between sufficient and good. For the present study, we determined the internal consistency at the child level of the SDQ-L subscales at baseline ($N = 3295$), calculated as suggested by Nezlek (2017): Emotional problems (range 0–10, $\alpha = 0.67$), behavioral problems (range 0–10, $\alpha = 0.66$), hyperactivity/attention deficit (range 0–10, $\alpha = 0.84$), problems with peers (range 0–10, $\alpha = 0.62$), and prosocial behavior (range 0–10, $\alpha = 0.71$). Each subscale consists of five questions and the first four subscales collectively comprise the sum scale "total problem score" (range 0–40, $\alpha = 0.79$). All items are scored on a three-point Likert scale with the response options (a) "not true," (b) "somewhat true," and (c) "surely true." Items of the SDQ-L cover behaviors like "restless, overly active, cannot sit still for very long" and "rather introvert, tends to play alone." For all scales, except prosocial behavior, higher scores reflect more problem behavior.

2.3 | Research respondents

Each measurement moment teachers completed the SDQ-L for all children in the classroom. In duo classes with two teachers, each teacher completed a list for half of the students. It is common in the Dutch school system that two teachers are responsible for one class. Both the teachers teach a few days of the week. In case of such "duo classes," the group were divided into two and each teacher completed a questionnaire for half of the students. A total of 16,353 questionnaires were completed, for 3,295 children at the first measurement, 3,298 at the second measurement, 3,325 at the third measurement, 3,239 at the fourth measurement, and 3,196 at the fifth measurement. The groups differ in size because of children as well as teachers entering and leaving the schools during the implementation period. The average number of students per school at baseline was 143 (standard deviation [SD] = 64.7; range, 36–317). Teachers filled in an average of 16.5 ($SD = 9.5$) lists per measurement moment. The low number of lists filled in per teacher can be

explained by the fact that in the Netherlands often several teachers are responsible for one class of students. Therefore, filling in the lists for a class was often divided among the responsible teachers.

2.4 | Analysis

Six linear mixed models were used to test whether perceived pupil behavior changed over time during the implementation of the SWPBS program. The scales “total problems,” “conduct problems,” “emotional problems,” “problems with hyperactivity,” “problems with peers,” and “prosocial behavior” were the dependent variables. In our data set, observations were nested in students, which were nested in teachers, which were nested in schools (four levels). For the upper three levels, a random intercept and a random slope were included in the model, to account for heterogeneity in the effects. Different model specifications were compared by removing the random slope at each level one by one and using the Bayesian information criterion to find the best-fitting model. A *p* value of 0.05 was used. Because the data distributions were skewed, we applied bootstrapping (with 499 replications) to obtain 95% confidence intervals for the estimates.

Moderation analyses were performed to explore possible heterogeneity in the effects. To this end, interactions between the time variable and potential moderator variables were tested. Moderator variables included characteristics of students (perceived problem severity at baseline, age, gender), teachers (average perceived problem severity in their classroom), and schools (average perceived problem severity of all students in the school, special vs. regular school). Because the population of teachers and students changed during the 3 years in which schools formalized the implementation, introducing moderator variables at the teacher and student level reduced the sample size to some extent. Moderation analyses with student and school characteristics were done in the sample with at least four measurements per student (total number of observations = 14,110). Moderation analyses including teacher characteristics were performed in the sample with teachers who participated in all five measurement moments (121 teachers, total number of observations = 8,046). The moderator variables were centered around their average. All interactions were included in the model and tested simultaneously.

3 | RESULTS

Table 1 shows the mean, standard deviation, and range of scores on the outcome measures at baseline. The SDQ-L norm scores based on the 95th percentile (Goodman, 1997) are included as well. At baseline, average scores on all outcome measures fell below the norm scores. Hence, there were relatively few perceived student behavior problems in our study sample. Note that prosocial behavior is assessed on an inverse scale (higher scores reflect more prosocial behavior).

The results of the linear mixed models are displayed in Table 2. All perceived problem behaviors showed a significant decrease over time, whereas prosocial behavior increased over time. In this study, we calculated the effect

TABLE 1 Means, standard deviation, and ranges of the outcome measures at baseline

	Mean	SD	Score range	Norm score
Emotional problems	1.52	1.99	0 to 10	2
Problems with hyperactivity	3.11	3.03	0 to 10	5
Problems with peers	1.50	1.91	0 to 10	2
Conduct problems	0.93	1.59	0 to 10	2
Prosocial behavior	7.69	2.38	0 to 10	6
Total problem score	7.06	6.22	0 to 34	10

Note. SD: standard deviation; *N* = 3,295. Prosocial behavior is a reverse scale; higher = better.

TABLE 2 Trends over time in perceived problem behavior in Dutch primary schools during the implementation of the SWPBS program

	Estimate for time trend (measurement)	Bootstrapped 95% confidence interval	<i>p</i>	Cohens' <i>d</i>
Emotional problems	-0.03	-0.06 to -0.01	<.001	-0.06
Problems with hyperactivity	-0.08	-0.12 to -0.05	<.001	-0.11
Problems with peers	-0.10	-0.12 to -0.07	<.001	-0.21
Conduct problems	-0.03	-0.05 to -0.01	<.001	-0.08
Prosocial behavior	0.12	0.09 to 0.16	<.001	0.20
Total problems	-0.21	-0.28 to -0.14	<.001	-0.14

Note. Linear mixed models with bootstrapped confidence intervals. *N* = 16,353. In bold: effect sizes $\geq |0.20|$ (Cohen, 1988). Prosocial behavior is a reverse scale; higher = better.

sizes based on Cohens' *d* because we were interested in the standardized difference over the five measurements. To this end, we calculated the estimated mean difference from baseline to the fifth measurement (B^*4) and divided this by the standard deviation of the outcome measure. When we look at the effect sizes, only those reflecting the impact of SWPBS on problems with peers and on prosocial behavior were 0.20 or larger and thus relevant according to the classifications proposed by Cohen (1988; small: $d \geq 0.20$; medium: $d \geq 0.50$; and large: $d \geq 0.80$).

3.1 | Heterogeneity in the time trend

For behavioral problems ($s^2 = 0.05$; 95% CI, 0.04–0.08; $p < 0.001$), problems with peers ($s^2 = 0.06$; 95% CI, 0.04–0.09; $p < 0.001$), and prosocial behavior ($s^2 = 0.11$; 95% CI, 0.08–0.16; $p < 0.001$) significant random slopes were

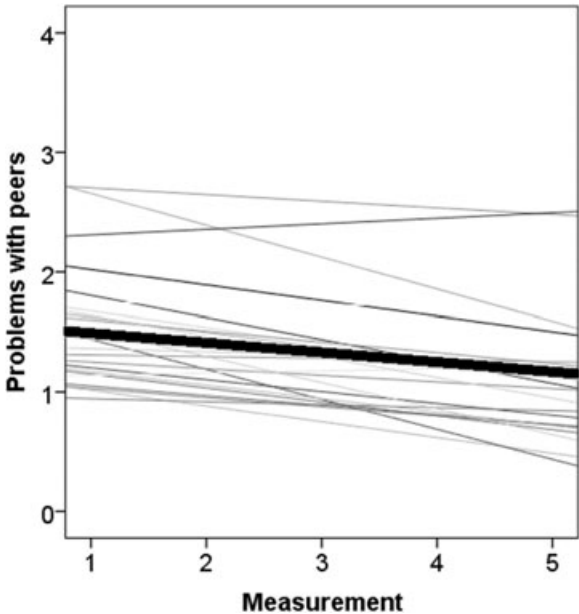


FIGURE 1 Trends over time for perceived problems with peers. In bold: the average time trend; and in gray: the time trends for each school separately (*N* = 23). The original scale is 0–10

found at the school level. Hence, improvements in problem behavior over time differed across schools. The heterogeneity at the school level is illustrated in Figure 1 for problems with peers. The bold line depicts the average decreasing trend. The other lines represent the trend for the different schools.

Significant random slopes at the teacher level were found for each outcome measure: emotional problems ($s^2 = 0.13$; 95% CI, 0.11–0.15; $p < 0.001$); hyperactivity ($s^2 = 0.13$; 95% CI, 0.11–0.15; $p < 0.001$); problems with peers ($s^2 = 0.08$; 95% CI, 0.07–0.10; $p < 0.001$); behavioral problems ($s^2 = 0.07$; 95% CI, 0.05–0.09; $p < 0.001$); prosocial behavior ($s^2 = 0.21$; 95% CI, 0.18–0.25; $p < 0.001$); and total problems ($s^2 = 0.45$; 95% CI, 0.40–0.52; $p < 0.001$). Hence, there was a significant heterogeneity in the effects of the intervention at the teacher level, while, on average, teachers reported a small decrease in perceived problem behavior, some teachers reported substantial decreases, whereas others perceived no changes over time or even increasing student behavior problems during the implementation of SWPBS. This is illustrated in Figure 2 for total problems, where the bold black line shows the average slightly decreasing trend, whereas the separate lines for each teacher are decreasing, increasing, or stable. For the sake of clearness, Figure 2 only includes ratings of teachers who participated in all five measurements.

In an attempt to explain this heterogeneity in the effects, moderation analyses were performed. Table 3 shows the results of the moderation analyses with the baseline score at the level of the child, age, gender, school type, and mean baseline score at the level of the school. The analyses show that for all problem behaviors the effect is more noticeable in children who show more problematic behavior at baseline. In addition, it appears that the implementation has a stronger effect on girls than on boys on all outcome measures besides emotional problems. Of all outcome measures, only prosocial behavior interacted with the school mean of baseline problems. The higher the baseline school mean for prosocial behavior, the stronger the effect. For all the outcomes except problems with hyperactivity, the effect was stronger at regular schools as opposed to special need schools.

The results of the interactions with the mean baseline score per teacher are not shown in Table 3 because these were performed on a smaller data set (N of observations = 8,046, N of teachers = 121). Only for emotional problems ($B = 0.04$; 95% CI, 0.01–0.07; $p = 0.02$) and for problems with peers ($B = 0.05$; 95% CI, 0.02–0.08; $p = 0.001$), a significant interaction was found between the trend over time and the mean baseline score per teacher. The effect of the intervention on these behaviors was smaller if the mean teacher perception of baseline problem behavior in the classroom was higher.

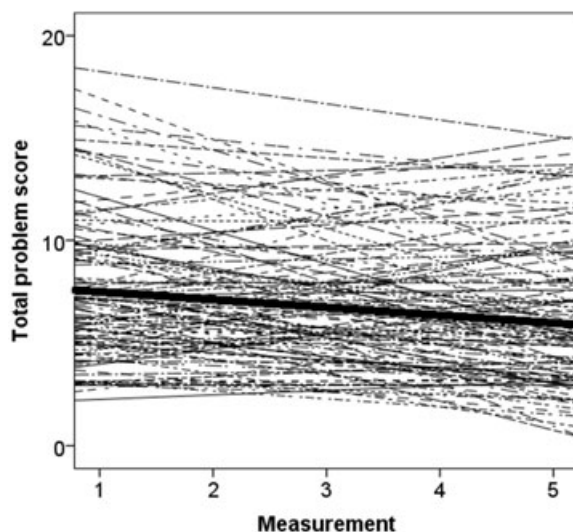


FIGURE 2 Trends over time for perceived overall problems. In bold: the average time trend; and in gray: the time trends for each teacher separately. The figure includes only teachers who participated in all five measurements ($N = 121$)

TABLE 3 Significant interactions with the time trend

Outcome	Baseline score child		Age		Gender		School type		Mean baseline score school	
	B	p	B	p	B	p	B	p	B	p
Emotional problems	-0.18	<0.001	-	-	-	-	0.25	<0.001	-	-
Problems with hyperactivity	-0.12	<0.001	0.02	0.04	-0.21	<0.001	-	-	-	-
Problems with peers	-0.15	<0.001	0.01	0.01	-0.05	<0.001	0.14	<0.002	-	-
Conduct problems	-0.14	<0.001	-	-	-0.07	<0.001	0.12	<0.004	-	-
Prosocial behavior	-0.18	<0.001	-	-	0.19	<0.001	-0.29	<0.001	0.04	<0.001
Total problems	-0.12	<0.001	-	-	-0.30	<0.001	0.58	<0.001	-	-

Note. Linear mixed models with bootstrapped confidence intervals. Gender, reference category = male; school type, reference category = regular. Only significant interaction effects are shown. All models contain the lower order terms. $N = 14,110$.

4 | DISCUSSION

4.1 | Strengths and limitations

Strengths of the present study are the large sample size and the absence of missing data. In addition, the sophisticated statistical analyses for clustered data enabled us to determine trends at the level of the school, teacher, and child. A limitation of the study is the lack of control groups. However, this does not make a difference for the purpose of this study because the main focus of this study is on demonstrating heterogeneity and the relative effectiveness on teacher perceptions. Further, an important limitation is that only outcomes at the child level were measured. There are no data available about the degree of implementation or the experienced skills of the teachers for implementation, nor on their self-efficacy in handling problem behavior and implementing SWPBS. Another limitation is the low internal reliability of the subscales emotional problems and problems with peers of the SDQ, despite the fact that this questionnaire has been validated in other research populations. In addition, a limitation of this study is that teachers filled out the SDQ questionnaire for the children they had in the classroom at the time of the measurement. In practice, this means that different teachers filled a questionnaire for the students at different measuring moments. The last limitation that we want to mention is the representativeness of the schools in the sample. All 325 schools in Drenthe were approached, of which 23 (7.1%) agreed to participate in the implementation of SWPBS for a pilot study.

4.2 | Effects of SWPBS

This is the first study on the impact of the SWPBS approach on teacher perception of (problem) behavior of all children in the classroom. We found small effects on perceived prosocial behavior and problems with peers. This is in concordance with findings in previous studies on SWPBS, which also reported small effects of the approach on comparable outcome measures (Bradshaw et al., 2008; Korpershoek, van Kuijk, Harms, de Boer, & Doolaard, 2014; Sørli & Ogden, 2015). In the present study, one of the reasons for finding only small effects of SWPBS on perceived student behavior might be the simple fact that the schools and teachers participating in our study experienced relatively few behavior problems of their students at baseline. Hence, there may have been little room for improvement in this particular sample. However, our multilevel analyses on the heterogeneity of the effects also pointed at a different possible interpretation of the small effects in this study but possibly also in previous studies. Average effects of SWPBS may be small, but the size of the effect may differ substantially across children, teachers, and schools. So, while for some children, teachers, and schools, the approach had a considerable positive impact, for others, the effects were absent or even disadvantageous. When positive effects on some are canceled out by negative or no effects on others, we should not conclude that SWPBS is hardly effective in changing teacher-perceived student behavior, but we have to unravel for which students, teachers, and

schools, this intervention may or may not be effective. We were able to study the impact of some, but not all, possible factors influencing the relation between SWPBS and teacher-perceived student behavior.

4.3 | For which students does SWPBS work?

In our study sample, SWPBS was less effective in boys than in girls. These findings align with the study by Sørli and Ogden (2007), in which SWPBS was slightly more effective in girls compared with boys. However, the differences were small. We found no other evidence for gender differences in the effect of SWPBS.

In addition, SWPBS seemed to be more effective for children with higher perceived behavior problems at baseline. Perhaps there is just more to gain with these children. In addition, “regression to the mean” may play a role: Research participants who score high at baseline tend to score closer to the average on follow-up measurements.

4.4 | For which schools does SWPBS work?

We found more impact of SWPBS in regular than in special schools. This may have to do with the fact that it takes longer to implement SWPBS in special needs schools. The program offers three levels of implementation. The primary strategies allow the implementation of a positive classroom climate in the school in which 80% of the students can function. In special need schools, it takes longer to successfully implement this primary classroom climate.

Another factor explaining differences across schools may be the thoroughness with which SWPBS was implemented in different schools. Research shows that the degree of implementation and the support of the implementation by the school’s leadership strongly influence the effect of the SWPBS approach (Bradshaw et al., 2010; Richter, Lewis, & Hagar, 2012). In the present study, the extent of the implementation has not been tested but presumably differs across schools. Future research may investigate factors related to the most effective training in coaching structures to enhance implementation quality.

4.5 | For which teachers does SWPBS work?

Our results showed less effect of SWPBS for teachers who perceive high levels of emotional problems or problems with peers in their classrooms. Perhaps this is caused by the fact that the more students in a class a teacher perceives to have severe problems the more negatively s/he will perceive the behavior of the remaining students in the class (Wienen, Batstra, Thoutenhoofd, Bos, & De Jonge, 2018), and so the less improvement the teacher perceives. It may also be possible that teachers whose perception is more negative in general will be less successful in implementing the SWPBS approach.

Other teacher characteristics, not investigated in our study, may also explain the heterogeneity in findings across teachers. For example, their education and experience might affect their ability to fully apply the SWPBS approach (Feuerborn & Chinn, 1997). Another explanation may be found in the view of the teacher on the possibility of change and their personal role therein. A study by Deng et al. (2017) indeed showed that the perception of the teacher of his own abilities to change a student's behavior may affect the effectiveness of their own approach and class management. Finally, the affinity of the teacher with the SWPBS approach may play a role.

5 | CONCLUSION

In this study, in the Dutch school situation on the impact of the SWPBS approach on teacher perception of problem behavior of all children in the classroom, we found small positive effects on perceived prosocial behavior and problems with peers. The SWPBS effects on perception of problem behavior differed across students, teachers, and

schools. Future multilevel studies may unravel which students, teachers, and schools benefit most from this approach and use these results for more effective implementation of SWPBS.

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